Application Number 09/975,522
Amendment dated January 16, 2007
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AMENDMENTS TO THE CLAIMS

This listing of claims will replace all prior versions and listings of claims in the application.

Listing of Claims:

Claim 1 (Currently Amended): An intermediate computer networking device for use on a computer network connecting a plurality of clients with a plurality of physical server devices ~~a single physical server device~~, the clients and physical server devices being configured to communicate using Hypertext Transfer Protocol (HTTP), the intermediate computer networking device comprising:

an HTTP multiplexor/demultiplexor configured to receive HTTP requests from the plurality of clients via a plurality of client TCP connections from the clients to the intermediate computer networking device, and to monitor response parameters that are specific to individual ones of a plurality of server TCP connections from the intermediate computer networking device to a plurality of corresponding sockets on the physical server devices,

wherein the HTTP multiplexor/demultiplexor includes a plurality of agents, each agent assigned to a different one of the client TCP connections from the clients to the intermediate computer networking device, and

wherein upon receiving an HTTP request from the client, the respective ~~agent~~ agent:

(1) identifies a single one of the plurality of physical server devices specified as a destination within the HTTP request;

(2) identifies at least two of the server TCP connections, the at least two identified server TCP connections coupling the intermediate computing device to a plurality of different sockets on the same physical server device specified as the destination within the HTTP request;

(3) selects one of the identified server TCP connections that couple the intermediate computing device to different sockets on the same physical server device specified as the destination within the HTTP request, wherein the selection is based on the ~~monitoring~~ monitored ~~of the~~ response parameters specific to the ~~server TCP~~

~~connections~~ different sockets on the physical server device specified as the destination within the HTTP request, and

(4) routes the HTTP request ~~to the selected server TCP connection for communication to the physical server device~~ over the selected one of the server TCP connections that couple the intermediate computing device to the different sockets on the same physical server device specified as the destination within the HTTP request ~~a corresponding socket on the physical server device,~~ for communication to the physical server device as a multiplexed HTTP request.

Claim 2 (Currently Amended): The computer networking device of claim 1, wherein the multiplexor/demultiplexor is further configured to receive multiplexed HTTP responses from the physical server device over the ~~individual server TCP connection~~ one of the plurality of sockets on the single physical server device that corresponds to the selected server TCP connection and to route those responses to the clients via ~~a~~ the plurality of client TCP connections.

Claim 3 (Currently Amended): A computer networking method for processing HTTP requests, the method comprising:

monitoring a plurality of server TCP connections from an intermediate computer networking device to a plurality of corresponding sockets on a ~~single~~ plurality of physical server devices to determine a response parameter that is specific to each of the server TCP connections;

receiving HTTP requests from a plurality of originating clients; ~~and~~

identifying a single one of the plurality of physical server devices specified as a destination within the HTTP requests;

identifying at least two of the server TCP connections, the at least two identified server TCP connections coupling the intermediate computing device to a plurality of different sockets on the same physical server device specified as the destination within the HTTP requests;

selecting one of the identified server TCP connections that couple the intermediate computing device to different sockets on the same physical server device specified as the destination within the HTTP request, wherein the selection is based on the determined response parameter for each of the identified server TCP connections;

routing the HTTP requests to ~~an individual network socket~~ one of the sockets on the physical server device specified as the destination within the HTTP requests, the socket corresponding to the selected server TCP connection, via a multiplexed TCP transmission using the selected server TCP connection.

Claim 4 (Previously Presented): The method of claim 3, wherein the response parameter is selected from the group consisting of least-lengthy response time, last-accessed socket, fewest number of unfulfilled requests, type of requested data, and size of requested data.

Claim 5 (Currently Amended): The method of claim 3, further comprising:

receiving HTTP responses from the physical server device specified as the destination within the HTTP requests via the ~~individual~~ selected server TCP connection; and

selectively routing the HTTP responses to the plurality of originating clients.

Claim 6 (Currently Amended): A computer networking method for data transfer between plural originating clients, a ~~single~~ plurality of physical server devices, and a networking device positioned on a computer network intermediate the clients and the physical server devices, the method comprising:

at the intermediate networking device,

monitoring a plurality of server TCP connections from the ~~computer~~ intermediate networking device to a plurality of corresponding sockets on the plurality of physical server devices to determine response parameters that are specific to each of the server TCP connections;

listening for HTTP requests from the originating clients;

receiving HTTP requests from more than one of the originating clients;

identifying a single one of the plurality of physical server devices specified as a destination within the HTTP requests;

identifying at least two of the server TCP connections, the at least two identified server TCP connections coupling the intermediate computing device to a plurality of different sockets on the same physical server device specified as the destination within the HTTP requests;

selecting one of the server TCP connections that couple the intermediate computing device to different sockets on the same physical server device specified as the destination within the HTTP requests, wherein the selection is based on the determined response parameter for each of the server TCP connections from the intermediate device to different sockets on the physical server device specified as the destination within the HTTP requests;

multiplexing the received requests for delivery to the physical server device specified as the destination within the HTTP requests via the selected server TCP connection; and

sending the received requests via the selected server TCP connection to an optimal one of the server sockets on the physical server device specified as the destination within the HTTP requests, the optimal socket corresponding to the server TCP connection ~~wherein the optimal server socket is~~ selected based on the determined response parameter.

Claim 7 (Original): The method of claim 6, wherein receiving HTTP requests from the originating clients occurs via client TCP connections.

Claim 8 (Currently Amended): The method of claim ~~7~~ 6, wherein the ~~client and~~ plurality of server TCP connections from the intermediate device to corresponding sockets on the physical server devices are persistent.

Claim 9 (Cancelled).

Claim 10 (Previously Presented): The method of claim 6, wherein the response parameter comprises a least-lengthy response time.

Claim 11 (Previously Presented): The method of claim 6, wherein the response parameter comprises a last-accessed server socket.

Claim 12 (Previously Presented): The method of claim 6, wherein the response parameter comprises the fewest number of unfulfilled requests.

Claim 13 (Previously Presented): The method of claim 6, further comprising listening for multiplexed HTTP responses from the optimal server socket.

Claim 14 (Original): The method of claim 13, further comprising receiving HTTP responses from the optimal server socket.

Claim 15 (Original): The method of claim 14, further comprising demultiplexing the received HTTP responses to permit selective routing and transmission of the received responses to corresponding originating clients.

Claim 16 (Original): The method of claim 15, further comprising sending the HTTP responses to the corresponding originating clients.

Claim 17 (Currently Amended): A computer networking method for data transfer between plural originating clients, a ~~single~~ plurality of physical server devices and an intermediate networking device, wherein the originating clients and the servers are configured to communicate over a computer network via the intermediate networking device, the method comprising:

at the intermediate networking device,

monitoring a plurality of server TCP connections from the intermediate networking device to a plurality of corresponding server sockets on the plurality of physical server devices to determine a response parameter that is specific to each individual one of the server TCP connections;

listening for HTTP requests from the originating clients;

receiving HTTP requests from more than one of the originating clients;

identifying a single one of the plurality of physical server devices specified as a destination within the HTTP requests;

identifying at least two of the server TCP connections, the at least two identified server TCP connections coupling the intermediate computing device to a plurality of different sockets on the same physical server device specified as the destination within the HTTP requests;

multiplexing the received requests;

determining an optimal one of the plurality of different server sockets on the physical server device specified as the destination within the HTTP requests based on the ~~determined~~ response parameter determined by monitoring the corresponding plurality of server TCP connections from the intermediate device to the plurality of server sockets on the physical server device;

sending the received requests as a multiplexed transmission to the optimal one of the plurality of server sockets on the physical server device specified as the destination within the HTTP requests via an individual one of the plurality of server TCP connections that corresponds to the optimal server socket;

listening for HTTP responses from the physical server device;

receiving HTTP responses from the physical server device;

demultiplexing the HTTP responses received from the physical server device to permit selective routing and transmission to corresponding originating clients; and

sending the received HTTP responses to the corresponding originating clients.

Claim 18 (Currently Amended): A computer networking device for use on a computer network to improve data transfer, the computer networking device being positioned intermediate plural clients and a ~~single~~ plurality of physical server devices, the clients and physical server devices being configured to communicate via the computer network using HTTP communication protocol, the intermediate computer networking device comprising:

an HTTP multiplexor/demultiplexor configured to receive HTTP requests from the clients via a plurality of client TCP connections from the clients to the intermediate computer networking device, and to monitor response parameters that are specific to individual ones of a plurality of server TCP connections from the intermediate computer networking device to a plurality of corresponding sockets on the physical server devices,

wherein the HTTP multiplexor/demultiplexor includes a plurality of agents, each agent assigned to a different one of the client TCP connections from the clients to the intermediate computer networking device, and

wherein upon receiving an HTTP request from the client, the respective ~~agent~~ agent:

(1) identifies a single one of the plurality of physical server devices specified as a destination within the HTTP request;

(2) identifies at least two of the server TCP connections, the at least two identified server TCP connections coupling the intermediate computing device to a plurality of different sockets on the same physical server device specified as the destination within the HTTP request;

(3) selects one of the ~~plurality~~ identified server TCP connections that couple the intermediate computing device to different sockets on the same physical server device specified as the destination within the HTTP request, wherein the selection is based on the ~~monitoring of~~ monitored response parameters specific to ~~the server TCP connections~~ the plurality of different sockets on the physical server device specified as the destination within the HTTP request; and

(4) routes the HTTP request ~~to the selected server TCP connection for communication to the physical server device~~ over the selected one of the server TCP connections that couple the intermediate computer networking device to the different sockets on the same physical server device specified as the destination within the HTTP request, and

wherein the computer networking device ~~being~~ is further configured to receive HTTP responses from the physical server device specified as the destination within the HTTP request, and route the received HTTP responses to a corresponding one of the clients.

Claim 19 (Cancelled).

Claim 20 (Currently Amended): The device of claim 18, wherein the server TCP connections from the intermediate computer networking device to the plurality of corresponding sockets on the plurality of physical servers are persistent.

Claim 21 (Currently Amended): The device of claim 18, wherein the ~~HTTP multiplexor/demultiplexor is further configured to determine an optimal server socket for receiving the HTTP requests~~ respective agent selects one of the identified server TCP connections by identifying the one of the identified server TCP connections from the intermediate computer networking device to the plurality of corresponding sockets on the physical server device specified as the destination within the HTTP request having the least-lengthy response time based on the monitoring.

Claim 22 (Currently Amended): A computer networking system for use with a computer network, they system comprising:

a plurality of physical server devices;

plural clients configured to connect to the physical server devices via the computer network; and

a computer networking device positioned intermediate the physical server devices and the clients on the computer network;

wherein the intermediate computer networking device is configured to monitor response parameters that are specific to individual ones of a plurality of server TCP connections from the computer networking device to a plurality of corresponding server sockets on the physical server devices, and

wherein the computer networking device comprises a plurality of agents, each agent assigned to a different one of a plurality of client TCP connections from the ~~computing~~ computer networking device to the clients, and

wherein the ~~agents~~ agents:

(1) receive HTTP requests from the ~~clients~~ clients,

(2) identify a single one of the plurality of physical server devices specified as a destination within the HTTP requests;

(3) identify at least two of the server TCP connections, the at least two identified server TCP connections coupling the intermediate computer networking device to a plurality of different sockets on the same physical server device specified as the destination within the HTTP request,

(4) select one or more of the identified server TCP connections that couple the intermediate computing device to different sockets on the same physical server device specified as the destination within the HTTP request, wherein the selection is based on the monitored response parameters specific to the plurality of different sockets on the physical server device specified as the destination within the HTTP request, and

(5) distribute ~~those~~ the received HTTP requests via multiplexed transmission to one or more of the plurality of server sockets on the physical server device specified as the destination within the HTTP request over the one or more selected server TCP connections. ~~connections to a server socket on the physical server device selected based on the response parameters determined by monitoring the server TCP connections.~~

Claim 23 (Currently Amended): The computer networking system of claim 22, wherein the computer networking device is further configured to receive HTTP responses from the physical server device specified as the destination within the HTTP request via a multiplexed transmission, demultiplex the responses, and route the multiplexed responses to corresponding clients via a the plurality of client TCP connections.

Claim 24 (Currently Amended): An intermediate computer networking device for improving data transfer via a computer network, the intermediate computer networking device being configured to monitor a plurality of persistent server socket connections from the intermediate computer networking device to a ~~single~~ plurality of physical server devices to determine a response parameter that is specific to each of the server socket connections, receive HTTP requests from a client, identify a single one of the plurality of physical server devices specified as a destination within the HTTP requests, identify at least two of the server socket connections, the at least two identified server socket connections coupling the intermediate computer networking device to a plurality of different sockets on the same physical server device specified as the destination within the HTTP request, determine an optimal one of the identified server ~~sockets~~ socket connections from the intermediate computer networking device to the physical server device specified as the destination within the HTTP request for each HTTP request based on the respective response parameters for each of the server ~~sockets~~ socket connections, and ~~to~~ send each HTTP request to the determined optimal one of the plurality of server socket connections from the intermediate computer networking device to the physical server device specified as the destination within ~~for~~ the request via a multiplexed TCP transmission.

Claim 25 (Previously Presented): The device of claim 24, wherein the device is further configured to receive an HTTP response from the optimal server socket and to send the HTTP response to the client.